

Use the Product Rule to differentiate the function.

1. $y = (x^2 - 3x)(x^2 + 1)$

2. $s(t) = \sqrt{t}(4 - t^3)$

3. $f(x) = x^4 \sin x$

4. $g(x) = (3 - x^2) \cos x$

Use the Quotient Rule to differentiate the function.

5. $f(x) = \frac{2x}{x^2 - 1}$

6. $f(x) = \frac{x^2 + 9}{x - 4}$

7. $y = \frac{x^2}{\cos x}$

8. $s(t) = \frac{\sin t}{\sqrt{t}}$

Find the derivative by rewriting each function. Do not use the Quotient Rule.

9. $y = \frac{x^2 - 5x}{10}$

10. $h(x) = \frac{3}{4x^3}$

11. $f(x) = \frac{6x^{3/2}}{2x}$

12. $g(x) = \frac{\sin x - x^3}{x^2}$

Find the derivative of the algebraic function.

13. $y = \frac{6-x-x^2}{x^2-4}$

14. $g(x) = \frac{x^3+4x+3}{x^2-1}$

15. $f(x) = \frac{2x-3}{\sqrt{x}}$

16. $h(x) = x^2 \left(1 - \frac{3}{x+2}\right)$

Find the derivative of the function, $f'(x)$ and find the derivative at the point $x = c$.

17. $f(x) = (x^3 + 1)(x^2 - 2x + 1); c = -1$

18. $g(x) = \frac{x^2-9}{x-2}; c = 1$

19. $f(\theta) = \theta \cos \theta ; c = \frac{\pi}{2}$

20. $s(t) = t^2 \sin t ; c = 0$

21. $f(x) = \frac{\sin x}{x^3}; c = 0$

22. $g(x) = x \sin x - 2x ; c = \frac{\pi}{2}$